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Z. Cai* (zcai@math.purdue.edu), Department of Mathematics, Purdue University, 150 N. University Street, West Lafayette, IN. *Flux Recovery and Accurate A Posteriori Error Estimation for Elliptic Equations.*

In this talk, I will introduce two new estimators on finite element approximations to general second-order elliptic partial differential equations. These estimators use recoveries of the flux in $H(\text{div})$ conforming finite element spaces. One of the estimators may be viewed as a modification of the recovery-based estimator, and the other is an exact estimator in a norm on any given mesh including arbitrary initial meshes without regularity assumptions. Exactness on any given mesh implies that the estimator is ideally perfect for error control on pre-asymptotic meshes, a paramount and difficult task in computation. No regularity assumptions imply that the estimator can be applied to problems of practical interests such as interface singularities, discontinuities in the form of shock-like fronts and of interior or boundary layers. (Received January 15, 2008)